

## REMARKS/ARGUMENTS

Apparatus claims 1, 2, 4 and 5 and method claims 6, 7, 9 and 10 remain in this application for examination, subject matter of claims 2 and 3 having been incorporated into claim 1 and of claims 6 and 8 having been incorporated into claim 6.

### **Claim Rejections - 35 U.S.C. §102:**

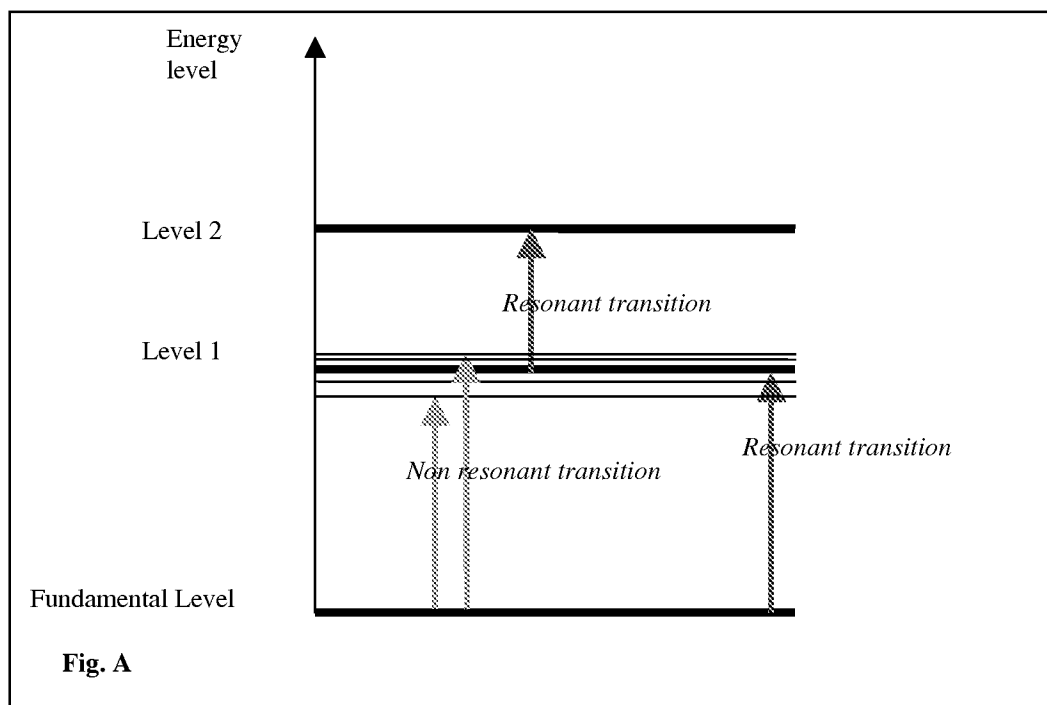
Claims 1-3 and 6-8 have been finally rejected under 35 U.S.C. §102(b) as being anticipated by Lin '082. Applicants respectfully traverse this final rejection.

By applying a source of laser light defined by the claimed parameters of both amended apparatus claim 1 and amended method claim 6, a laser light beam is applied to the retina which generates intracellular singlet oxygen for occluding abnormal retinal vessels, while having the capability of passing through the cornea, aqueous humor, crystalline lens and vitreous humor of the eye. This occlusion is performed without the thermal damage accompanying the primary reference, Lin '082.

Applicants are claiming a method and an apparatus which allows treatment of age related maculopathy (ARM) with a destructive, but non-thermal laser light beam. The meaning of the terminology "destructive but non-thermal light beam" and an explanation of constraints which apply to transmission of a laser light beam through layers in the eye in order to reach the retina are further explained below.

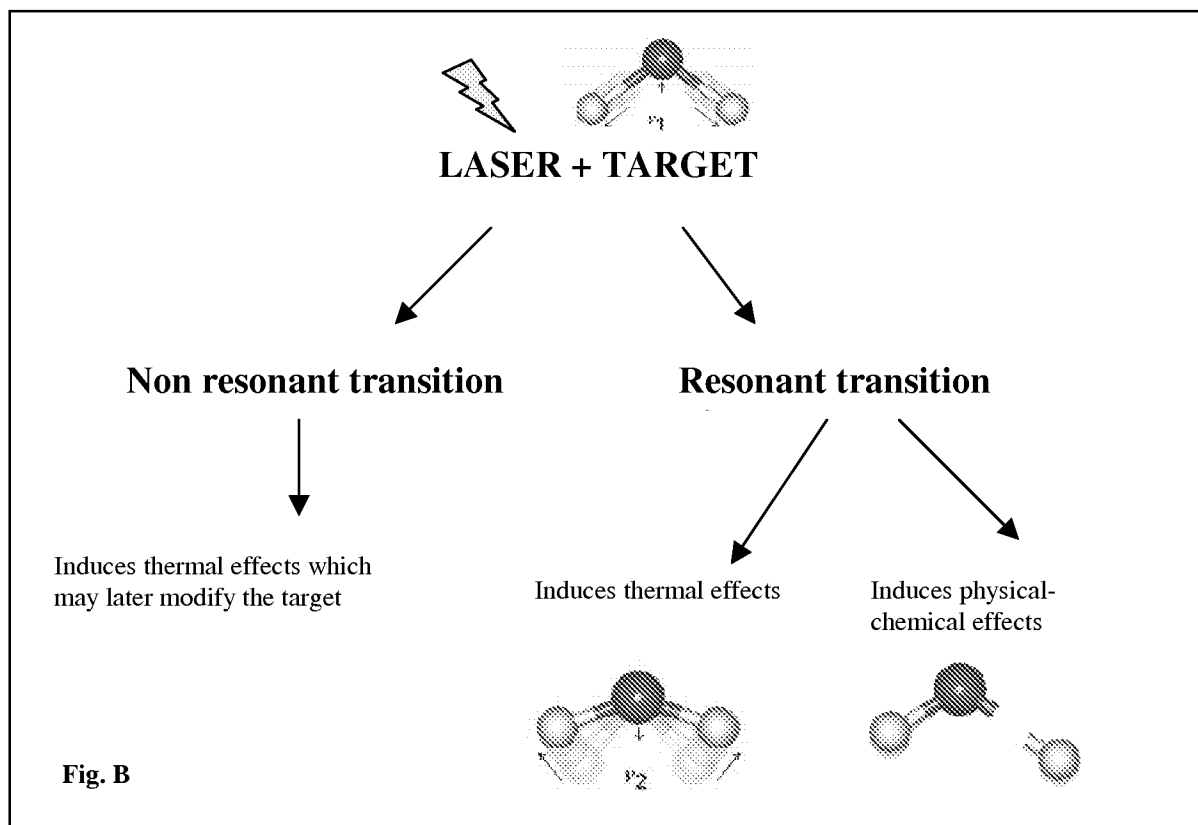
As is seen in Fig. A, when a light beam is directed onto a target (such as a molecule, an atom, or the like), two types of laser absorption by the target may happen. The first is related to absorption on non-resonant transitions and the second is related to absorption on resonant transitions.

See the following figure:



In the first type (Level 1 of Fig. A, absorption on non resonant transitions), an increase in temperature of the target occurs, but no direct physical-chemical modification occurs (target modifications may happen, but the modifications are due to an increase of temperature).

In the second type (Level 2 of Fig. A, absorption on resonant transitions), the result is either a thermal effect (e.g. change of vibration mode of a water molecule), or physical-chemical effects leading to molecular changes, more particularly occurring when the transitions are electronic (e.g. separation of atoms of water molecules).



As is seen in Fig. B, In a resonant transition, a 1% variation of the wavelength (e.g. a 13 nm variation with a 1270 nm wavelength laser) has the effect of going out of the resonant transition and then falling into a non-resonant transition, which implies that effects are not the same.

Also as seen in Fig. B, in the case of a non-resonant transition, a 10% variation of the wavelength (e.g. 130nm variation with a 1270 nm wavelength laser) does not result in going out of the non-resonant transition, which implies that effects remain quasi-identical.

In the case of ARM, with the apparatus and method of Applicants' invention, Applicants are in the second case, i.e., in the resonant transition, which induces physical-chemical effects, since the wavelength used (1.26 to 1.27  $\mu\text{m}$ ) is absorbed by an O<sub>2</sub> molecule that transforms O<sub>2</sub> to singlet oxygen (free radicals). If the wavelength does not remain in the interval of 1.26  $\mu\text{m}$  - 1.27  $\mu\text{m}$ , no absorption occurs in the resonant transition, therefore no creation of singlet oxygen occurs. Since

Lin '082 fails to disclose an apparatus and method limited to the 1.26  $\mu\text{m}$  to 1.27  $\mu\text{m}$  wavelength, anticipation does not occur. Accordingly, the Final Rejection based on Lin '082 should be withdrawn.

#### Importance of the laser light beam transmission

With ARM treatments according to Applicants' invention, the target of the beam is the retina. Thus, four successive layers of the patients eye are crossed: the cornea, the aqueous humor, the crystalline lens and the vitreous humor. The most sensible and sensitive elements of the eye are the cornea and the crystalline lens. These two elements present a very high transmission capacity at the claimed wavelength. Thus, their absorption and resulting thermal heating induced by absorption, is low.

On the other hand, Lin '082 is directed to photocoagulation occurring within the treatment of the cornea. There is no mention in Lin '082 of using Applicants' claimed destructive, but non-thermal, laser beam. Rather, Lin '082 uses a two laser treatment for tissue ablation in which a second laser is used subsequent to use of the first tissue ablation laser. This is done in order to help to coagulation of tissue. The second laser has a very long treatment time (a pulse duration greater than 200 seconds is recited in claim 11), implying a very high thermal effect which would harm the eye during an ARM treatment.

In ARM treatment, the laser beam must cross the cornea and the crystalline lens without causing damage to them, but still must be able to treat the macula behind the cornea and crystalline lens. None of the apparatus and/or methods described in Lin '082, which is directed to photocoagulation in a cornea treatment, such as a presbyopia treatment; have this result.

For the foregoing reasons, Lin '082 fails to disclose every limitation of claims 1-3 and 6-8. Accordingly, it is respectfully requested that the final rejection under 35 U.S.C. §102(b) be withdrawn.

**Claim Rejections - 35 U.S.C. §103:**

Claims 4-5 and 9-10 have been rejected under 35 U.S.C. §103 as unpatentable over Lin '082 in view of Rice et al. '309. Applicants respectfully traverse this final rejection.

It is respectfully submitted that Rice et al. '309 does not cure the deficiencies of Lin '082 as a reference against Applicants' claims in that Rice et al. '309 is directed to conventional dynamic phototherapy set forth on pages 4 and 5 of Applicants' specification under the Background of the Invention. Rice et al. '309 requires use of photosensitive drugs such as VISUDYNE®, which require that the patient avoid sunlight for up to 48 hours. Moreover, the protocol requires multiple treatments which are expensive and can lead to harmful side effects due to injection of photosensitive drugs. That Rice et al. '309 uses an optical fiber, Raman laser for treating tumors, does not suggest that such a laser is useful for treating ARMD when emitting a wavelength " in a range of 1.26μm to 1.27μm to generate intracellular singlet oxygen." The entire disclosure of Rice et al. '309 is directed to treating tumors not to alleviating ARMD. Accordingly, Rice et al. '309 is evidence of patentability rather than *prima facie* obviousness. Therefore, it is respectfully requested that the Final Rejection of claims 4, 5, 9 and 10 based on obviousness be withdrawn.

If the Examiner for any reason feels a personal conference with Applicants' attorneys might expedite prosecution of this application, the Examiner is respectfully requested to telephone the undersigned locally.

§Appl. No. 10/521,164  
Amdt. dated April 9, 2008  
Reply to Final Office Action of, October 9, 2007

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

/John R. Moses/

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